

we should have liked a well-considered opinion from the authors!

In an area like the Shetlands the great interest, from a faunistic point of view, centres on the birds; and among these the great skua holds the foremost place, since its only British breeding-stations are on these islands. So much has been of late years written on this subject, both in newspapers and in ornithological journals, that it is one with which the public are tolerably well acquainted. Nevertheless, the account given by the authors of the almost complete extermination of this fine species, and its subsequent rehabilitation by the efforts of various members of the Edmonston family and Mr. Scott, of Melby, will be read with interest, and forms a concise summary of the whole affair. We should, however, like to know more with regard to the meaning of the statement that "protection for the skuas implies some measure of protection also for the gulls; but unless the latter greatly increase, the former cannot be expected to do so."

Some interest also attaches to the specimen of the collared pratincole killed by Bullock in 1812, as being the only example of the species hitherto shot in North Britain. In the fourth edition of "Yarrell" the skin is stated to be in the British Museum, but the investigations of the authors fail to confirm this statement.

Greater attention is, however, merited by the account of the nesting of the storm petrel, which sometimes lays its eggs among large stones on the shore, and in other cases selects deserted rabbit-burrows for its home. The crofters, knowing the value set on the eggs of this bird by collectors, and being likewise extremely partial to young petrels as a *bonne bouche*, are extremely reluctant to indicate the rabbit-holes in which the birds nest to strangers.

To many it will come as a surprise to learn that ravens are still common in the islands; so numerous, indeed, as in certain districts to prove very destructive to the poultry and stock, on which account war is waged against them by the crofters. In contrast to the abundance of these birds is the scarcity of rooks, which are, indeed, little more than casual visitors to the islands.

The weakest point about the book is undoubtedly, as the authors themselves are fain to confess, the section on fishes, the classification followed being altogether obsolete and discredited.

R. L.

PHYSICAL CHEMISTRY.

Introduction to Physical Chemistry. By James Walker, D.Sc., Ph.D. Pp. x + 332. (London: Macmillan and Co., Ltd.)

IT is now nearly ten years since Prof. Walker placed English students under obligation by his admirable translation of Ostwald's "Outlines of General Chemistry." Since that time "little Ostwald" has been the source from which most students have taken their first draught of information about physical chemistry in its modern form. The phrases and paraphrases of the book, the diagrams, the perpetual motions "which are impossible" have become almost painfully familiar to the examiner. The present writer is one of those who believe that

Ostwald's book has been of the highest service to chemistry. At the same time, it must be admitted that it is one to be used with care. There is an illusory appearance of simplicity about it, and if care be not taken the use of the book is eminently calculated to lead to a learned smattering. It is, in fact, a book which forms the summary of a course of instruction, and for beginners it must be supplemented by an extended commentary by an experienced teacher.

These observations arise inevitably in connection with Prof. Walker's new book, which, in size, appearance and typography, as well as in its topics, bears so striking a resemblance to Ostwald's "Outlines." The first question that the reader will ask is—Where lies the difference between the two books? This question is soon answered as one reads; Prof. Walker's book is more limited in range and incomparably simpler. To quote the author's words, it "makes no pretension to give a complete or even systematic survey of physical chemistry"; the aim is to give a full discussion of some of the chief principles of modern physical chemistry, and to show their application to ordinary laboratory chemistry.

Dr. Walker has achieved his purpose in a most satisfactory manner, and has produced a book which will be a real boon to students of physical chemistry. He writes with the knowledge of a specialist and the experience of a teacher, and it is very striking to any one who knows the difficulties of students to see how perfectly Dr. Walker appreciates them. Not less striking are the expository power and resourcefulness with which the difficulties are handled. Whilst the whole book is clear, readable, and abreast of the times, some chapters deserve special attention. The one on chemical equations is amongst these. It gives a rational account of the art of constructing chemical equations by dissection and summation, a subject which has been strangely neglected by text-book writers. The chapter on fusion and solidification is made very clear by a thorough discussion of the mutual relations of salt, ice and water. The wide generalisation, or group of generalisations known as the Phase Rule, is expounded within reasonable limits. Hitherto there has been nothing concise on this subject in the English language. The chapters relating to the modern theories of solution are, it need scarcely be said, written with fulness of knowledge and in the spirit of a true believer in the doctrine of electrolytic dissociation. Chemical dynamics is treated succinctly, and admirably illustrated by examples. There is a distinct gain here in departing from the strict historical development of the subject, which is apt to confuse beginners by the series of fresh starts which it involves. The concluding chapter on thermodynamical proofs is made as clear as it well could be. At the end of each chapter references are given to original articles which have appeared in English journals and to English books. The list of these is quite gratifying, but the wisdom of confining the references to English publications seems questionable. The extraordinary backwardness of students in acquiring a reading knowledge of German is condoned by such a restriction; and, besides this, it would have been a service to many students who had some knowledge of the language if Dr. Walker had helped them to select

the really important pioneering papers from the vast periodical literature that has arisen in Germany during the past ten years.

In concluding this notice, one is naturally led to reflect upon the attitude which appears to be still maintained by a number of English chemists in regard to the modern theories of solution. There can be no doubt that a student reading Dr. Walker's book will become imbued with these theories, and will acquire convictions that will be difficult to eradicate. If these theories are wrong, if they are even strongly suspect, the responsibility of the teacher becomes serious. It is true Dr. Walker gives here and there some indications of the objections which have been urged against them, but there is no explicit statement of the opposition case. The question arises whether an opposition case can be explicitly stated. The theory of ionic dissociation has been applied to explain and co-ordinate a very large number of chemical facts, and has thrown light on matters that were previously dark. The contention of the objectors appears to be mainly that this light is illusory. The present writer is far from claiming judicial functions in the matter; but he ventures to think that the opposition to the dissociation theory would be more respected, both here and on the Continent, if it were of a more positive character, and if a more tangible alternative theory could be presented which should prove itself not less comprehensive and practically productive than the one which is assailed. The history of science shows plainly enough that a comprehensive theory with some weak points will hold its ground until a not less comprehensive theory with fewer weak points makes its appearance. It is probably on this ground that Prof. Walker takes his stand in freely imparting the doctrine of electrolytic dissociation to elementary students of physical chemistry.

ARTHUR SMITHELLS.

OUR BOOK SHELF.

Catalogue of the Lepidoptera Phalaenae in the British Museum. Vol. ii. Catalogue of the Arctiadae (Nolinae, Lithosianae) in the collection of the British Museum. By Sir George F. Hampson, Bart. Pp. xx + 589, and plates xviii-xxxv. (London: Printed by order of the Trustees, 1900.)

THE first volume of this series, containing the Syntomidae, was published in 1898, and we have now to welcome the appearance of the second, comprising two groups, which the author treats as sub-families of the Arctiadae; the typical Arctiadae being reserved for the third volume. 1193 species are described in the second volume, all of which, except 162, belong to the Lithosianae, the Nolinae being a comparatively small sub-family.

The enormous extent of the insect-world is but little realised, even by naturalists, unless they are entomologists; but, considering the progress already made, we are probably well within the mark in saying that it may well take fifty volumes, and the whole of the new century, to complete the Catalogue before us; and yet the moths are only a portion of one of the seven principal orders of insects, and one which is probably far surpassed in number of species by at least three other orders.

The descriptions of the species are necessarily brief, but are arranged on a uniform plan which admits of easy comparison; and their determination is further facili-

tated by comprehensive tables of genera and species, and by the large proportion which have been figured, either in the crowded coloured plates, or in text-illustrations. We are glad to see that space has been found for notices of larvæ, when known. Space has also been devoted to phylogeny; but it is, perhaps, an open question whether it is worth while to deal with this subject in a descriptive work at all. At best, it can only express the momentary and necessarily fluctuating opinions of an individual author on the affinities of genera and species from the very imperfect materials at present available; for until the earlier stages of a considerable number of forms have been carefully studied and tabulated for comparison, it is impossible for us to judge of them completely or accurately. We would therefore prefer to treat this branch of the subject tentatively, in ephemeral publications, rather than to introduce a necessarily fluctuating factor, of merely temporary value at best, into a standard work of reference, of such great and permanent value to all lepidopterists as the present. We must also object to the author's tendency to dogmatise on the subject, especially as our knowledge of fossil insects is at present practically nil, and of the early stages of the great majority no better. Such a phrase as [the Arctiadae form] "a family of moths derived from the Noctuidæ," seems to us quite out of place in a scientific book at the present state of our knowledge; though a formula which we find a little further on is less objectionable; "the *Nolinae* probably arose from a very early Arctian form which had affinities in the *Noctuidæ* to *Hypenae* and *Sarothripae*."

But these are details of individual taste or judgment; while there cannot be two opinions respecting the value and importance of the work.

W. F. K.

Giordano Bruno, zur Erinnerung an den 17 Februar, 1600. Von Alois Riehl. Zweite neu bearbeitete Auflage. Pp. iv + 56. (Leipzig: Engelmann, 1900.)

EARLY in 1600 Giordano Bruno went to the stake in the cause of free speech and thought. The ashes of martyrdom have ere now kept evergreen even reputations and names that were otherwise of little worth. But Bruno's life and work are alike memorable. Few, however, of those to whom the romantic wander-years and heroic death appeal, have leisure and training to grapple with the technical Latin and hard Italian of the versatile and stormy Nolan. The tercentenary, therefore, of Bruno's tragedy can have no memorial more fitting than Prof. Alois Riehl's "Giordano Bruno." Would that it were in English! Dating originally 1889, Prof. Riehl's brochure has undergone revision thorough and throughout. It puts Bruno in his right setting of time and place. It resumes, with brevity and lucidity quite noteworthy, the principles for which Bruno gave his life. Bruno originated neither Copernican physics nor pantheistic metaphysics. His debt to one close forerunner at least is not small. Yet in taking the new astronomy as a scientific basis, and only therefrom passing to such metaphysical conceptions as infinity and unity, while reaching out ultimately to a monistic principle, it is Bruno and not his precursors, physicist and revived neoplatonist, that may claim to father modern naturalism. Prof. Riehl characterises the system as "theocentric," since nature is, for Bruno, *deus in rebus*. Bruno is said to have met the process which resulted in his condemnation by equivocating between what he accepted *secundum fidem* and what he affirmed *secundum rationem*. At any rate, whatever human weakness he may have shown, he lost no opportunity of reaffirming his principles. He recanted nothing. He could have saved himself would he but have prostituted his pen to apologetics on behalf of the reigning orthodoxy. He chose not *propter vitam vivendi perdere causas*. And he died a knight-errant of the free spirit.

H. W. B.